PEACE/WILLISTON
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COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey of Unnamed Lake (Crash Lake)

K. Mathias
March 1997

PWFWCP Report No. 164

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

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A RECONNAISSANCE SURVEY OF

UNNAMED LAKE (CRASH LAKE)

WATERSHED:	**Williston Reservoir (Finlay Reach)**
DATE OF SURVEY:	**September 15-16, 1996**
FIELD CREW LEADER:	**Mark Hunter**
FIELD ASSISTANT:	**Karin Mathias**
REPORT PREPARED BY:	**Karin Mathias**
REPORT EDITTED BY:	**Mark Hunter**

BRITISH COLUMBIA CONSERVATION FOUNDATION

PEACE / WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

FUNDED BY: FOREST RENEWAL BRITISH COLUMBIA

RELEASED BY: _____

D. J. Cadden, Regional Fisheries Biologist

105-02091/

LAKE: Unnamed Lake (Crash Lake) SYSTEM NAME: Ospika River

A.S.A.P. REFERENCE NO.: WATERSHED CODE: 230-9358

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved O_2 / Temp. Profiles	X
Physical Data	X	Winter Dissolved O_2 / Temp. Profiles	--
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	X
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	X
Obstructions and Pollutions	X	Scale Reading	X
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices	
Miscellaneous Comments	X	A: Water Chemistry Analysis	X
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	C: Fish Scale Analysis	X
History of Previous Surveys '	X	Bathymetric Map Reduction	X
Water Chemistry Summary	X	Bathymetric Map	--

LOCATION

Location:	approximately 137 km north-northwest of Mackenzie		
Elevation:	925 m ± 25 m	U.T.M.:	10.428056.6250440
Latitude / Longitude:	56°23'35" 124°09'56"	N.T.S. Map No.:	94 C/8 edition 2
Management Unit:	7-37	Biogeoclimatic Zone:	Sub-Boreal Spruce
Ecoprovince:	Sub-Boreal Interior	Ecoregion:	Central Canadian Rocky Mountains
Ecosection:	Misinchinka Ranges		

Drainage: Unnamed C. --> Unnamed L. --> Williston Reservoir (Ospika Arm - Finlay Reach) --> Peace R.

PHYSICAL DATA

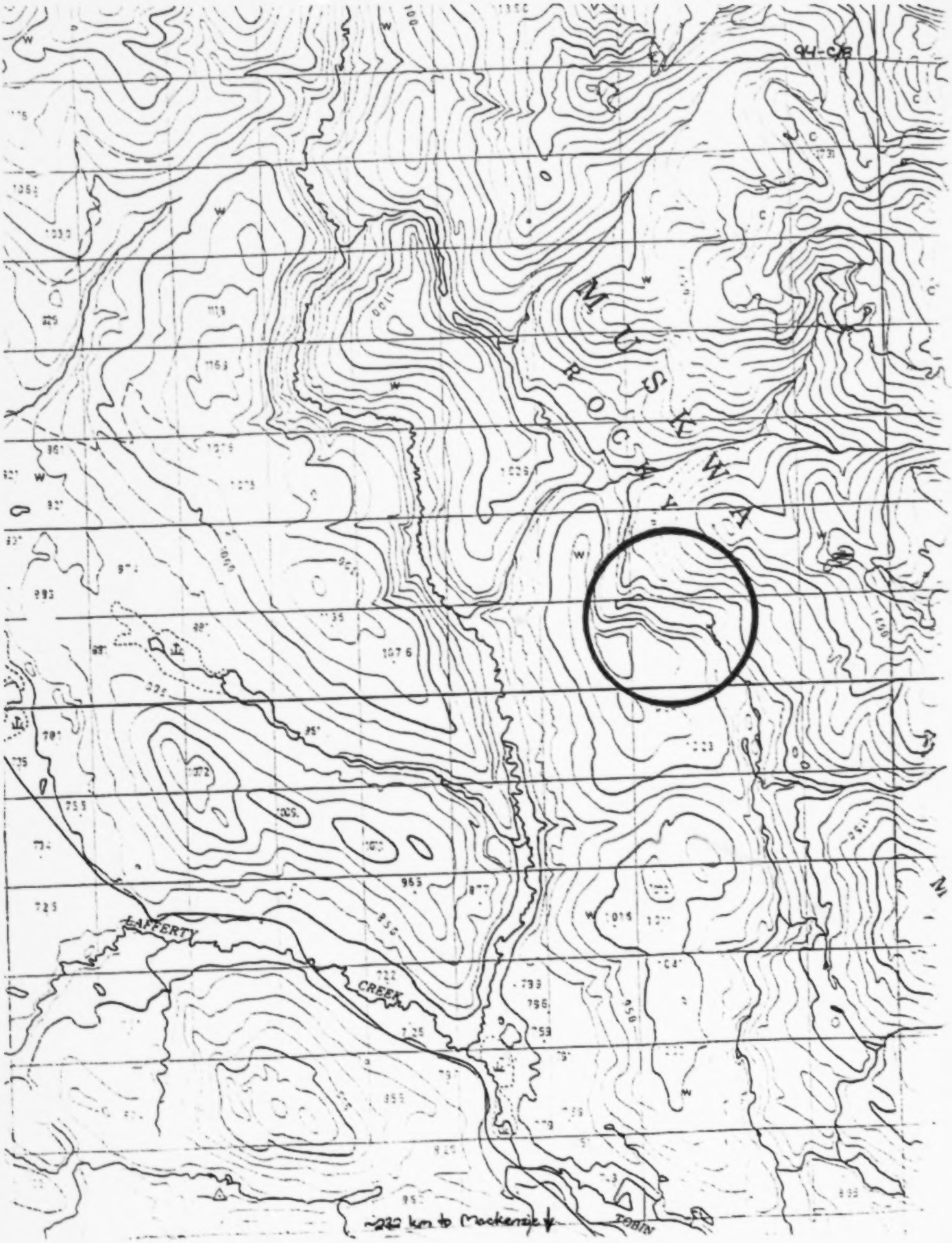
Lake Drainage Area:	2.4 km^2	Volume:	1 464 880 m^3
Water Surface Area:	193 682 m^2	Perimeter of Islands:	120 m
Area Above 6 m Contour:	92 115 m^2	Number of Islands:	1
Shoreline Perimeter:	2 959 m	Mean Depth:	7.6 m
Maximum Depth:	21.1 m	Secchi Reading:	7.2 m
Filterable Residue (TDS):	350 mg/L		

Sounding Device: Lowrance X-15 Elevation Source: Contour Interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 28 cm diameter spruce tree that is 2.1 m from the present water's edge, located on the north side of the lake, approximately 125 m southeast of Inlet #2 (Plate #3).

High Water Mark: 0.10 m above water level at time of survey


94-C/8
MUSKWA
ROCKIES
LAFFERTY
CREEK
~220 km to Mackenzie
TOBIN

LAKE: Unnamed Lake (Crash Lake)

TERRAIN FEATURES Immediate

Shoreline:

The shoreline slope of Crash Lake is low to the northeast near the outlet, and to the west where a sedge grass swamp is located. The low northeast side of Crash Lake is fronted by sedge grasses, and backed by grasses and spruce trees. High, steep sloped hills are situated on the north and south sides of the lake. The steep south side is fronted by alder, devil's club, Labrador tea and fir trees, and backed by a forest of spruce and deciduous trees. The steep north slope is fronted by alder and Labrador tea, and backed by a forest of lodgepole pine, spruce and deciduous trees.

The shoreline substrate consists of silts and organics with gravels and cobbles occasionally found underneath. The lake bottom drops off quite steeply on the north and south sides of the lake. A more gradual drop off is found to the east, towards the outlet creek. The west bay is shallow and drops off quite suddenly and steeply where the bay begins to widen.

Surrounding Country:

Crash Lake is surrounded by a mature forest of spruce, lodgepole pine, fir, and deciduous trees. High hills and mountains surround Crash Lake along the north, south and west sides of the lake. The terrain to the east, along the outlet creek, is fairly flat. A cut block is located on the top of the high ridge to the south of the lake, and a gravel logging road runs from the cut block to the outlet creek of Crash Lake At the time of survey, a bridge had not yet been installed over the outlet. Crash Lake is situated within the Sub-Boreal Spruce biogeoclimatic zone.

LAKE: Unnamed Lake (Crash Lake)

ACCESS

Directions:

From the junction of the Finlay-Davis Forest Service Road and the Finlay-Ospika Forest Service Road (just north of Ospika Camp - operated by Timber West), drive for approximately 12.4 km on the Finlay-Davis Forest Service Road. Turn right on to the Tobin Main Line, and proceed for approximately 7.4 km. Turn right on to the Tobin 3,000 Road, and drive for 3.3 km to the first creek crossing. This creek is the outlet to Crash Lake. Gear can be hauled in to the lake along the side of the outlet. From Ospika Camp, the total distance to Crash Lake is approximately 23.1 km.

This area has no direct access by road. To reach Ospika Camp, the truck and gear must be barged up out of Mackenzie by Finlay Navigation Inc. They can be reached at (250) 964-3525 in Prince George or at (250) 997-3525 in Mackenzie. The crew must be flown up on one of the local airlines as no passengers are allowed to travel on the barge. At the time of the survey, the barge left Mackenzie on Tuesday and Friday at approximately 1800, and docked at the Ospika Landing (located approximately 1.0 km south of Ospika Camp) at approximately 0200 hrs the next morning.

Road Type and Conditions:

The Finlay-Davis Forest Service Road and the Tobin Main Line are both wellmaintained, two lane gravel roads that are easily traveled with a two-wheel drive vehicle during the summer. The Tobin 3000 Road is a one-lane, gravel road that can be traveled in a two-wheel drive truck during dry weather.

Restrictions:

Although there are no restrictions, it is recommended that a truck radio be used when traveling the gravel roads.

LAKE: Unnamed Lake (Crash Lake)

RESORTS AND CAMPSITES

There are no resorts or campsites on Crash Lake.

OTHER DEVELOPMENTS None noted.

OBSTRUCTIONS AND POLLUTIONS

None noted.

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

The following aquatic plants were identified in Crash Lake during the time of survey:

sedge grasses Chara sp.

WILDLIFE OBSERVATIONS

The following wildlife or wildlife signs were seen/heard during the time of the survey:

muskrat moose droppings and tracks

MISCELLANEOUS COMMENTS

1) Bathymetric map: The lake outline was drawn from an enlargement of air photo 30 BCB 93088: No. 206, flown on September 17, 1993.

2) There was very little flat, dry terrain surrounding Crash Lake that appeared suitable for camping or for a Forest Recreation Site.

LAKE: Unnamed Lake (Crash Lake)

LAKE DRAINAGE General:

Two inlets feed Crash Lake at the northeast and east sides of the lake. The lake is drained to the southeast by an unnamed creek that flows for 9.5 km to an unnamed lake. The unnamed outlet of this lake flows for 8.5 km to the Ospika Arm of the Williston Reservoir (Finlay Reach). All distances given are approximations.

Major Systems:

There are no major systems.

Minor Systems: Inlet # 1 -

Unnamed Creek

Inlet # 1 enters Crash Lake at the east end of the lake (Plate # 4). From the mouth of Inlet # 1 to 20 m upstream of the lake, the average wetted width is 0.3 m and the average depth is 0.2 m. The undercut banks are approximately 0.05 m high, and are grown over with moss and sedgegrasses. The channel substrate, consisting of fines and small gravels, may provide some rainbow trout spawning habitat. Approximately 20 m upstream of the lake, Inlet # 1 is braided. The left braid (looking upstream) has an average wetted width of 0.15 m and an average depth of 0.1 m. This channel braids many more times, and has many small falls of 0.3 m maximum height. The first falls on this channel most likely prevents the upstream passage of fish. The right braid (looking upstream) has an average wetted width of 0.25 m and an average depth of 0.15 m. A falls is located 25 m upstream of the lake, approximately 5 m upstream of the first braid. The source of the falls is flowing from underground (the water flow could be heard but not seen), and thus fish are prevented from moving upstream past this point.

A Stream Survey card was completed for a sample site located approximately 15 m upstream of Crash Lake (Plate # 5 and # 6). The average wetted width is 0.4 m. The substrate is composed of fines (55%), and gravels (45%). The creek morphology is mainly runs (95%) with some pool sections (5%), and has a gradient of 2.0%. The water temperature at the time of the survey was 6.0°C. For additional information, refer to Appendix B.

Inlet # 2 - Unnamed Creek

Inlet # 2 enters Crash Lake on the northeast side of the lake. The inlet runs down a moderately steep slope, often flowing over moss covered large woody debris. From the mouth of the inlet to 12 m upstream of the lake, the average wetted width of the channel is 0.2 m (except at the channel mouth which widened to 0.35 m) and the average channel depth is 0.03 m. The substrate of Inlet # 2 consists of silts, fines and small woody debris

(sticks and leaves), occasionally over large cobble; the substrate at the inlet mouth is comprised of small cobbles and the occasional boulder. The riparian vegetation consists of moss, Equisetum sp., devil's club, and alder shrubs. Approximately 12 m upstream of Crash Lake, the flow of Inlet # 2 goes underground for 1 m, and the channel begins to braid many times. The channel is fed by underground flow permanently at 20 m upstream of the lake. Inlet #2 had no fisheries potential during the survey period.

Outlet - Unnamed Creek

The outlet drains Crash Lake at the southeast end of the lake over beaver dam # 1 (Plate # 7). Beaver dam # 1 is 0.8 m high and 30 m long. Water flowed freely over the top of the dam at the time of survey, likely making the upstream movement of fish possible but difficult. From beaver dam # 1 to beaver dam # 2, located approximately 50 m downstream of the lake, the outlet has an average wetted width of 2.0 m and an average depth of 0.5 m. The channel substrate consists of silts, organics and aquatic vegetation over gravels. Beaver dam # 2, 0.7 m high and 25 m long, is possibly passable to the upstream movement of large fish at the time of survey, and likely passable to fish at higher flows (Plate # 8). From beaver dam # 2 to beaver dam # 3, located approximately 75 m downstream of Crash Lake, the outlet forms a pond approximately 16 m wide and 25 m long, with an average of 0.5 m deep. The pond substrate is comprised of a thick layer of silts and organics over gravels and boulders. Beaver dam # 3, 0.6 m high and 15 m long, appeared to be passable to the upstream movement of fish at the time of survey, as water flowed freely over the top of the dam (Plate # 9). Downstream of beaver dam # 3, the outlet substrate consists of gravels and cobbles with large woody debris over top. Bridge supports are located 100 m downstream of the lake in preparation for future bridge installation "(Plates # 10). Rip-rap has been placed to stabilize the right bank (looking downstream). At this site (100 m downstream of the lake) an unidentified salmonid approximately 10-15 cm long, was observed. A debris jam, which appeared passable to fish, is located approximately 115 m downstream of Crash Lake. The debris jam, created by three fallen trees, forces the channel to braid. The braids rejoin the main channel 125 m downstream of the lake. Downstream of 125 m, the average wetted width of the outlet is 2.2 m and the average depth is 0.25 m. The substrate consists of gravels and fines, and abundant cover exists in the form of large woody debris that has fallen into the channel. The riparian vegetation, growing thickly over the channel, consists of alder, willow, and devil's club.

A Stream Survey card was completed for a sample site located approximately 180 m downstream of Crash Lake (Plate # 11 and # 12). The average wetted width is 2.3 m and the average maximum riffle depth is 0.2 m. The substrate is composed of gravels (65%), fines

LAKE: Unnamed Lake (Crash Lake)

FISHERIES MANAGEMENT COMMENTS

Crash Lake appears to have a good, healthy population of rainbow trout (fish up to 822 g or 1.8 lb were captured). Of thirty rainbow trout sampled, only 13 had gill lice present on gills and/or fins, and only one fish had visible internal parasites. Four small rainbow trout were angled with a lure at the time of survey during approximately 1 hour of evening fishing. Crash Lake also contains a population of longnose suckers (Catostomus catostomas). This lake will likely provide an excellent low to medium intensity fishery as long as the potential rainbow trout spawning habitats, located in Inlet #1 and in the outlet, are protected. At the time of survey, Crash Lake was already subject to some angling pressure from forest workers operating out of Ospika Camp due to the recent accessibility of the lake by road. If the bridge construction continues under the same conditions as were observed at the time of the survey (ie: proper use of rip-rap, etc.), there will probably be minimal impact to the creek downstream of the bridge site.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Studies:

None known.

LAKE: Unnamed Lake (Crash Lake)

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	September 16, 1996		
Time:	1220 hrs	Air Temperature:	10.0°C
Wind Velocity:	0-1 km/h	Wind Direction:	N/A
Cloud Cover:	10/10 o.c.	Surface Conditions:	calm
Secchi Disc:	7.2 m	Water Colour:	greenish, slightly cloudy

Method Used:

Dissolved Oxygen:	YSI Model 58 Oxygen / Temperature Meter
Water Temperature:	YSI Model 58 Oxygen / Temperature Meter
Air Temperature:	Hand-Held Alcohol Thermometer
pH (field):	Digital pH Pocket Tester
H2S (field):	Hach H_2S Field Test Kit
Laboratory Used:	Pacific Environmental Science Center
Water Sampler:	Vertical Alpha Water Bottle (Vandorn)
Metal Sampler:	By Hand; Preserved With 2.0 mL Nitric Acid
Substrate Sampler:	Substrate Sample Not Taken

Water Sample Chemistry: **SEAM Site No.: E223151**

	Sampling Depths	
	Surface (0.5 m)	Lower (19.0m)
Alkalinity (lab)	156 mg/L	267 mg/L
Filterable Residue 105°C (lab)	350 mg/L	490 mg/L
H2S (field)	N/A	N/A
Nitrogen - Total (lab)	0.21 mg/L	3.0 mg/L
Non-Filterable Residue (lab)	< 5 mg/L	6 mg/L
pH (field)	8.4	8.2
pH (lab)	8.2	7.8
Phosphorus - Total Dissolved (lab)	0.004 mg/L	0.076mg/L
Specific Conductance (lab)	513 uS/cm	731 uS/cm

Bottom Depth: 19.9 m

Substrate Sample Depth: N/A (bottom substrate consisted of silts and organics).

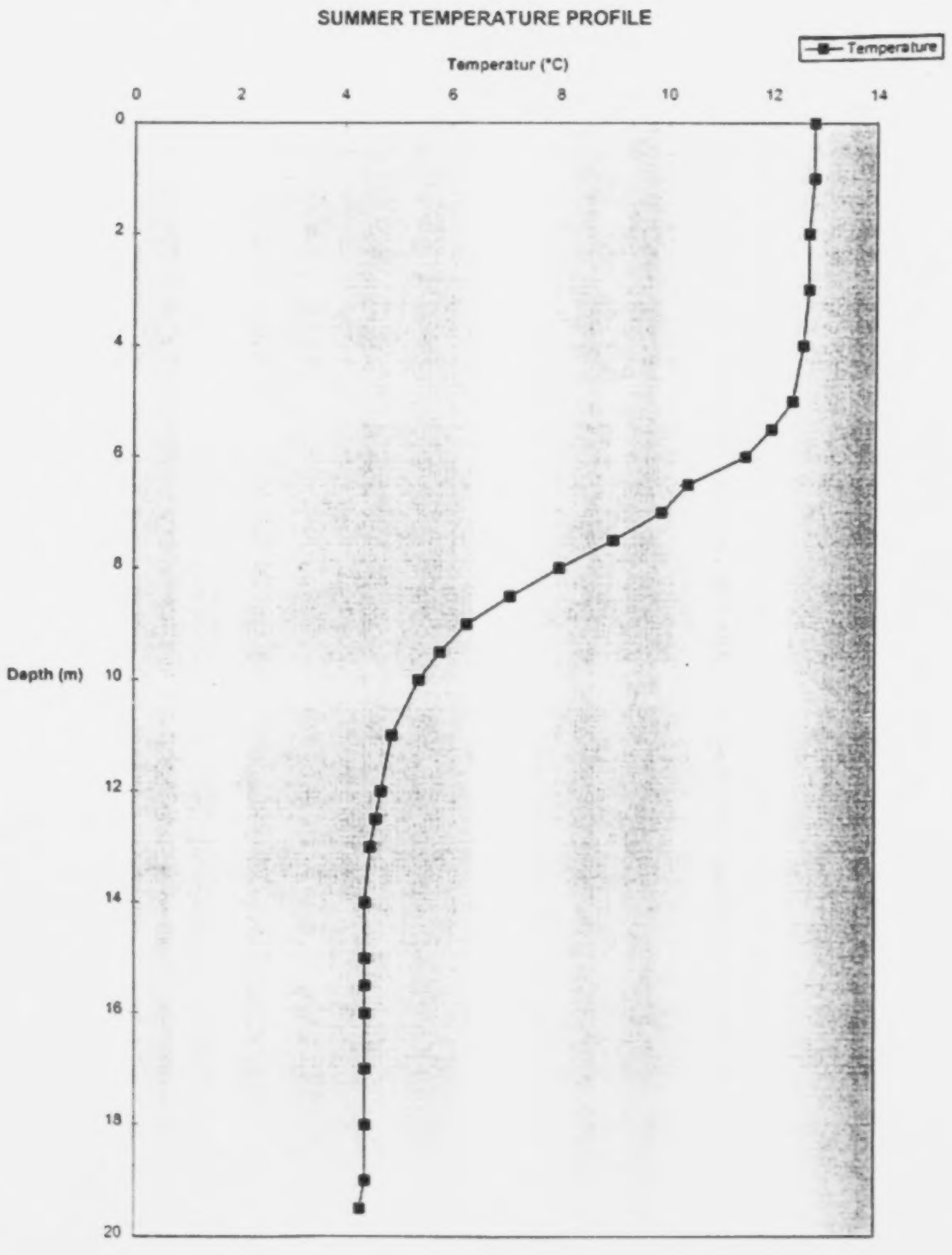
* additional analyzed parameters and results, including metals, are found in Appendix A

LAKE: Unnamed Lake (Crash Lake)

SUMMER OXYGEN / TEMPERATURE DATA

DEPTH (m)	O_2 (mg/L)	TEMPERATURE (°C)
Surface	9.6	12.8
1.0	9.4	12.8
2.0	9.2	12.7
3.0	9.3	12.7
4.0	9.3	12.6
5.0	9.0	12.4
5.5	8.2	12.0
6.0	8.5	11.5
6.5	4.3	10.4
7.0	2.8	9.9
7.5	0.7	9.0
8.0	2.0	8.0
8.5	7.7	7.1
9.0	7.7	6.3
9.5	6.6	5.8
10.0	6.6	5.4
11.0	6.8	4.9
12.0	-	4.7
12.5	-	4.6
13.0	-	4.5
14.0	0.6	4.4
15.0	0.8	4.4
15.5	5.2	4.4
16.0	5.1	4.4
17.0	5.4	4.4
18.0	5.2	4.4
19.0	5.0	4.4
19.5	5.0	4.3
21.1	Bottom	

Comments: The oxygen readings are not accurate as the YSI Model 58 was malfunctioning at the time of the survey.



* Oxygen data was inaccurate due to equipment malfunction, and is not shown.

LAKE: Unnamed Lake (Crash Lake)

NETTING RECORD

Mesh Size Experimental Order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE # 1

Type:	Sinking Monofilament Gill Net			
Date Set:	September 16, 1996		Time:	20:08 hrs
Date Lifted:	September 17, 1996		Time:	08:20 hrs
Net Dimensions:	Length:	91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm		Depth:	1.3 m
			Substrate:	fines and large woody debris
Deep End Mesh Size:	64 mm		Depth:	14.0 m
			Substrate:	silt / organics

Comments: The net started approximately 3.5 m from the shore.

Species	Netting Site *No.* 1	Angled	Other	Total	Number Sampled	Number Preserved	Size Range (cm)
RB	41	4	0	41	30	0	11.2-40.1
LSU	29	0	0	29	0	1	11.3-15.8

MINNOW TRAPS:

Bait: Sardines

Trap No.	Hours	Depth (m)	Substrate	Species	No. Caught	Size Range (cm)
1	12:27	1.0	silt / organics	empty	0	-
2	12:27	0.9	boulder / cobble with organic debris	empty	0	-
3	12:27	0.9	Chara sp. over fines	empty	0	-
4	12:24	0.9	silt / organics	empty	0	-

LAKE: Unnamed Lake (Crash Lake)

INDIVIDUAL FISH DATA

Date Captured: Sept. 17, 1996

Method: Sinking Monofilament Gillnet

M - Male
F - Female
? - Not Obvious

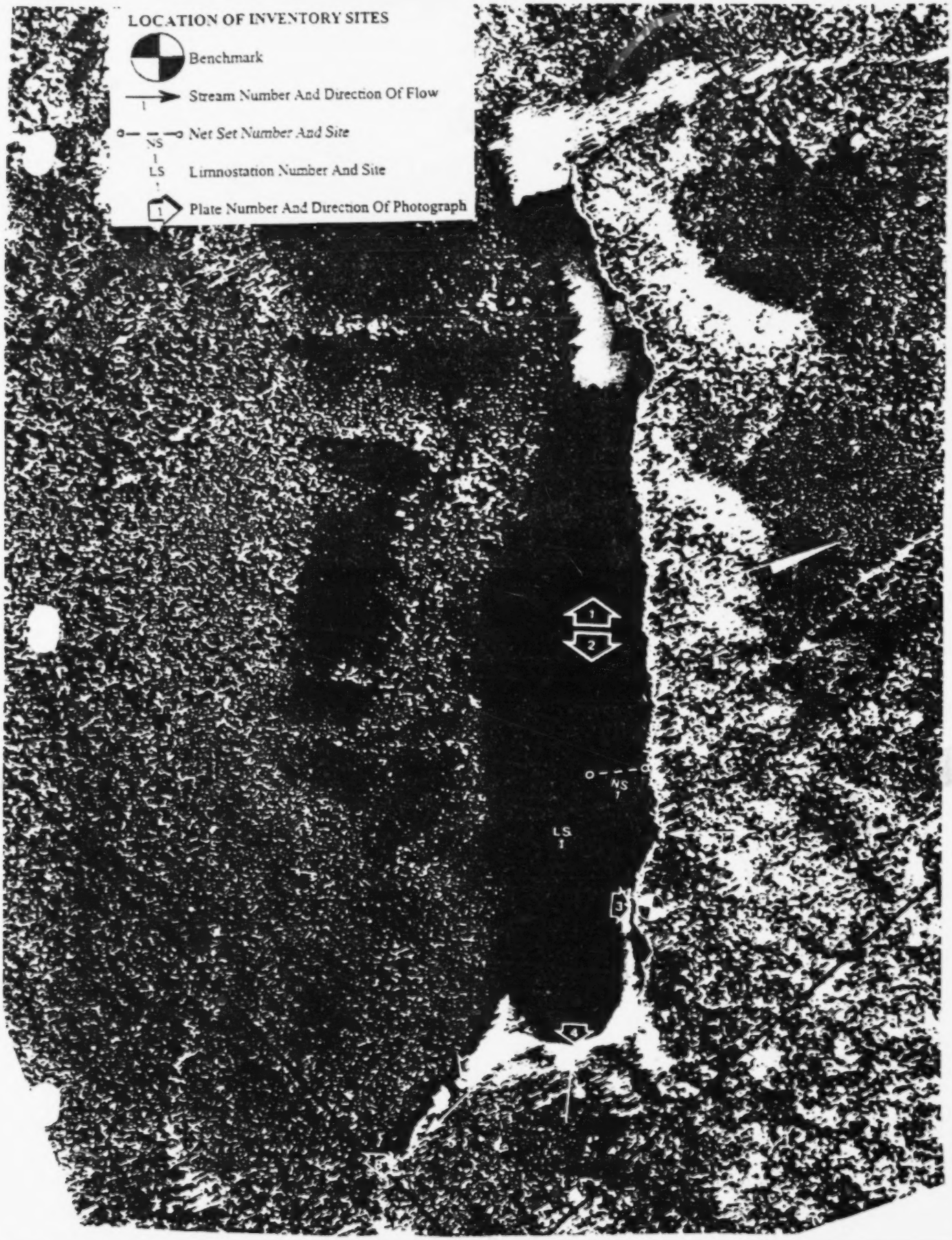
IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

EG - Egg
FR - Fin Ray
HD - Head
ML - Milt
OT - Otolith
SC - Scale

Species	Fork Length (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
RB	28.2	288.0	F	MG	SC	2+	Ch				Li
RB	36.3	634.0	M	MG	SC	5+		DF			
RB	29.8	314.0	M	IMM	SC	2+	Ch				
RB	40.1	822.0	M	MG	SC	4+		B			Li
RB	36.9	648.0	M	MG	SC	4+	Ch, Da				Li
RB	28.4	314.0	M	MG	SC	2+	G, Ch	DF			Li
RB	32.3	397.0	F	IMM	SC	2+	Da				Li
RB	35.8	580.0	F	MG	SC	4+	Da				Li
RB	31.3	368.0	F	IMM	SC	2+	Da				Li
RB	32.4	422.0	F	MG	SC	3+	Da				Li
RB	29.7	331.0	M	MG	SC	3+			WF		Li
RB	36.5	600.0	F	MG	SC	4+	Da				Li
RB	36.0	582.0	M	IMM	SC	3+	Da				Li
RB	32.6	422.0	M	MG	SC	2+	G				Li; TW in body wall
RB	32.0	407.0	M	MG	SC	2+					empty
RB	28.8	292.0	F	MG	SC	2+	Da				
RB	11.3	15.5	F	IMM	SC	1+					empty
RB	12.4	20.0	M	IMM	SC	1+	G				
RB	11.2	15.5	M	IMM	SC	1+				O	
RB	12.4	23.0	F	IMM	SC	2+	G	Di			
RB	13.6	25.5	F	IMM	SC	1+	Da	B			
RB	14.3	29.0	F	IMM	SC	**	Da				
RB	12.8	24.5	M	IMM	SC	1+	Da	B			
RB	14.8	37.0	M	IMM	SC	1+	G			O	
RB	15.9	49.0	F	IMM	SC	1+	Ch				
RB	11.8	18.0	F	IMM	SC	1+		Cr			
RB	13.5	28.0	M	IMM	SC	1+		Di			
RB	11.9	15.5	M	IMM	SC	1+		B		O	
RB	14.5	31.0	M	IMM	SC	2+	Ch				Li
RB	12.8	24.5	M	IMM	SC	1+		Cr, Di			

B - Beetle
C - Clams
CF - Caddis Fly
Ch - Chaoborus
DF - Dragonfly
Cr - Chironomids
Da - *Daphnia*
Di - Diptera
G - *Gammerus*
DM - Damselfly
L - Leech
Li - Lice
O - Organics
S - Snails
A - Terrestrial Ant
St - Stomach
TW - Tape Worm
WB - Water Boatman
WF - Whole Fish
K - Kidney

** scale had regenerated - not able to age


LOCATION OF INVENTORY SITES
Benchmark
1
Stream Number And Direction Of Flow
NS
1
Net Set Number And Site
LS
1
Limnostation Number And Site
1
Plate Number And Direction Of Photograph
1
2
NS
1
LS
1
3
4

LAKE: Unnamed Lake (Crash Lake)

PHOTOGRAPH DIRECTORY

Plate	Roll : Number	Description
1	30:15-16	Panoramic view of Crash Lake looking west, taken from the center of the lake. Note: the adjacent cut block is visible on the top of the south ridge (left side of photo).
2	30: 12-13	Panoramic view of Crash Lake looking east, taken from the center of the lake.
3	30: 8	View of the benchmark located 2.0 m above the present water level in a 28 cm diameter spruce tree that is 2.1 m from the present water's edge, located on the north side of Crash Lake, approximately 125 m southeast of Inlet #2.
4	30: 7	View of the mouth of Inlet #1 where it enters Crash Lake at the east end of the lake.
5	29: 3	Upstream view from the bottom of the Stream Survey card sample site on Inlet #1, located 10 m upstream of Crash Lake.
6	29: 4	Downstream view from the top of the Stream Survey card sample site on Inlet #1, located 20 m upstream of Crash Lake.
7	30: 6	View of the mouth of the outlet draining Crash Lake over beaver dam #1.
8	29: 2	Upstream view of beaver dam #2 on the outlet, located 50 m downstream of Crash Lake. Dam height is 0.7 m.
9	30: 24	Upstream view of beaver dam #3 on the outlet, located 75 m downstream of Crash Lake. Dam height is 0.6 m.
10	30: 21	Downstream view of the bridge supports for future bridge installation over the outlet, located 100 m downstream of Crash Lake. Note the rip-rap on the right side of the channel.
11	30: 20	Upstream view from the bottom of the Stream Survey card sample site on the outlet, located 190 m downstream of Crash Lake.
12	30: 19	Downstream view from the top of the Stream Survey card sample site on the outlet, located 170 m downstream of Crash Lake.

LAKE: Unnamed Lake (Crash Lake)

Plate #1: Panoramic view of Crash Lake looking west, taken from the centre of the lake. Note: the adjacent cut block is visible on the top of the south ridge (left side of photo).

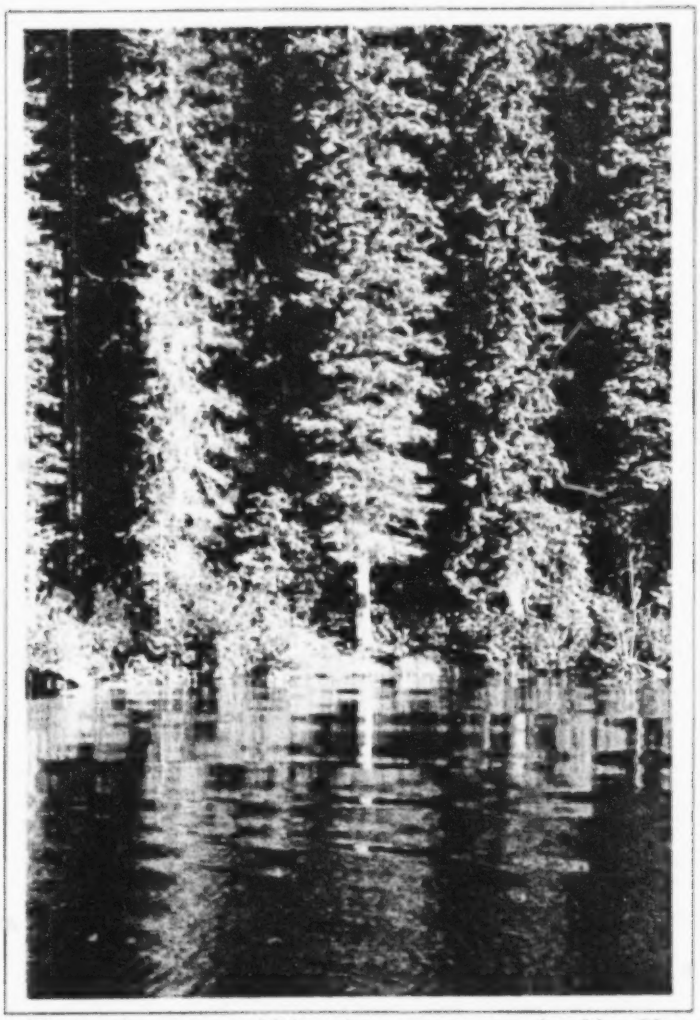


Plate #3: View of the benchmark located 2.0 m above present water level in a 28 cm diameter spruce tree that is 2.1 m from the present water's edge, located on the north side of Crash Lake, approximately 125 m southeast of Inlet #2.

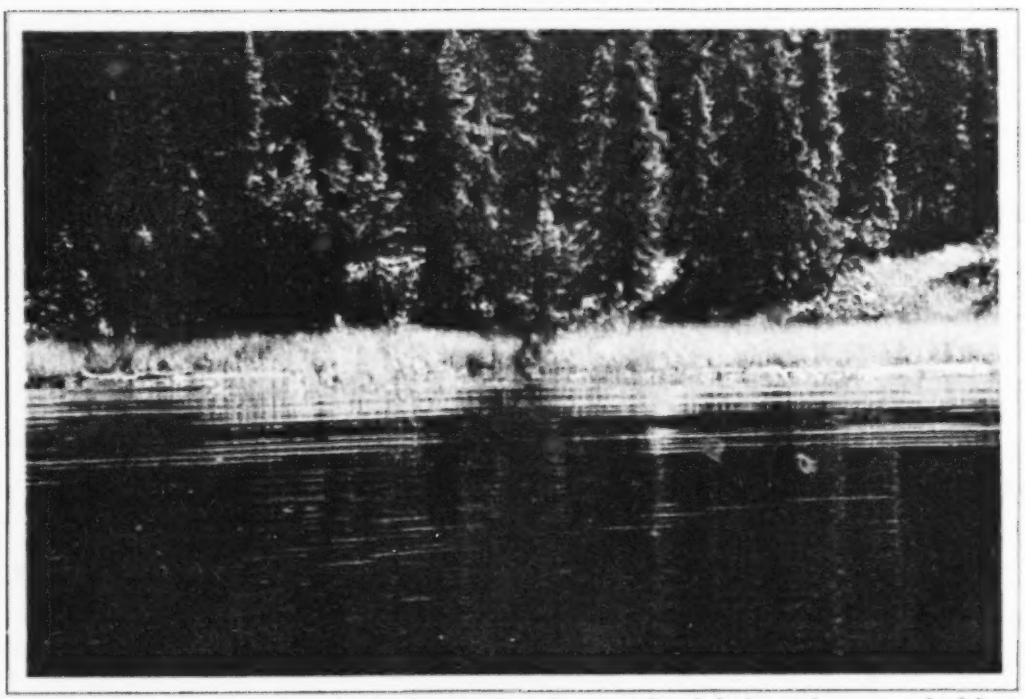


Plate #4: View of the mouth of Inlet #1 where it enters Crash Lake at the east end of the lake.

LAKE: Unnamed Lake (Crash Lake)

Plate #5: Upstream view from the bottom of the Stream Survey card sample site on Inlet #1, located 10 m upstream of Crash Lake.

Plate #6: Downstream view from the top of the Stream Survey card sample site on Inlet #1, located 20 m upstream of Crash Lake.

LAKE: Unnamed Lake (Crash Lake)

Plate 4 7: View of the mouth of the outlet draining Crash Lake over beaver dam # 1.

Plate # 8: Upstream view of beaver dam # 2 on the outlet, located 50 m downstream of Crash Lake.

Plate # 9: Upstream view of beaver dam # 3 on the outlet, located 75 m downstream of Crash Lake. Dam height is 0.6 m.

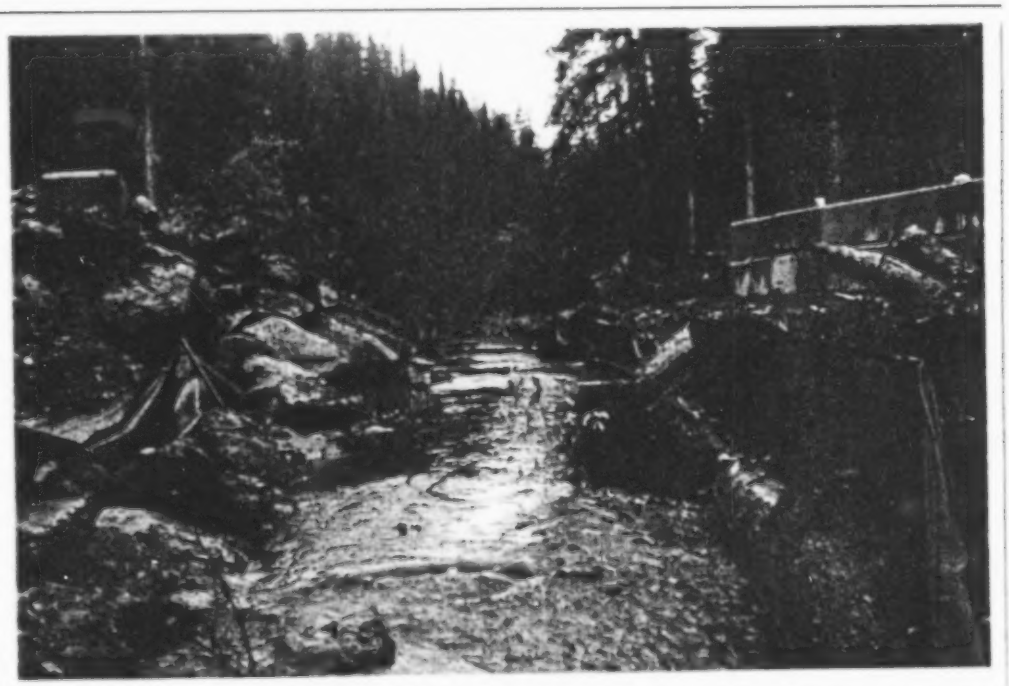


Plate # 10: Downstream view of the bridge supports for future bridge installation over the outlet, located 100 m downstream of Crash Lake. Note the rip-rap on the right side of the channel.

LAKE: Unnamed Lake (Crash Lake)

Plate # 11: Upstream view from the bottom of the Stream Survey card sample site on the outlet, located 190 m downstream of Crash Lake.

LAKE: Unnamed Lake (Crash Lake)

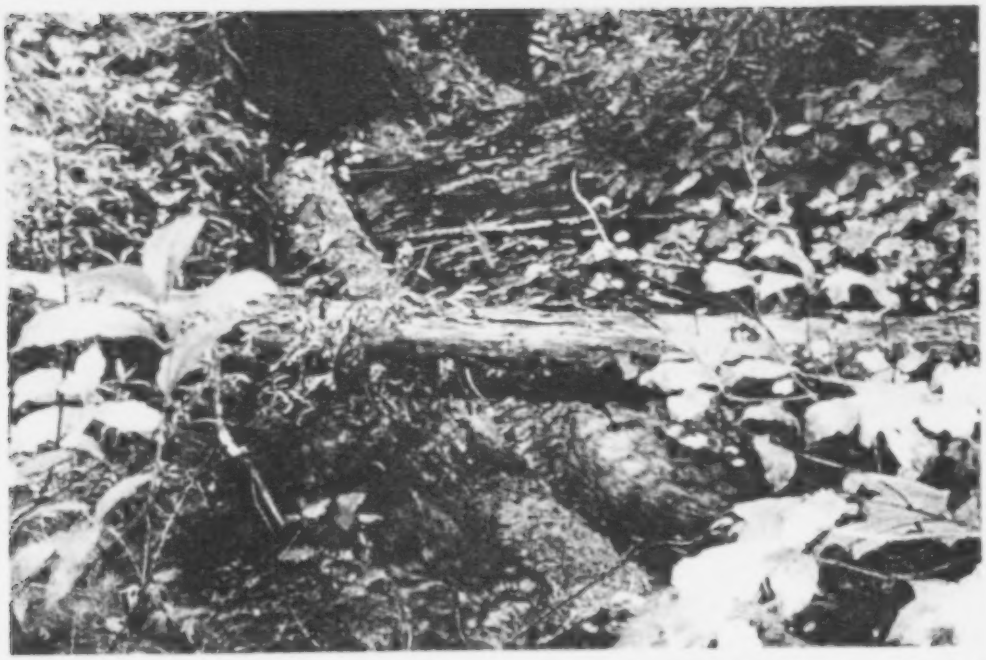


Plate # 12: Downstream view from the top of the Stream Survey card sample site on the outlet, located 170 m downstream of Crash Lake.

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

RESULTS FOR UNNAMED LK-CRASH LK SAMPLES

Parameter Analyzed		Units	964995-001	964995-002
ALKALINITY		mg/l	156	267
CONDUCTIVITY		uS/cm	513	731
METALS/TOTAL (WATER-ICP)	AG	mg/l	<.01	-
	AL	mg/l	<.06	-
	AS	mg/l	<.06	-
	B	mg/l	<.01	-
	BA	mg/l	.005	-
	BE	mg/l	<.001	-
	CA	mg/l	70.2	-
	CD	mg/l	<.006	-
	CO	mg/l	<.006	-
	CR	mg/l	.013	-
	CU	mg/l	<.006	-
	FE	mg/l	.015	-
	K	mg/l	.5	-
	MG	mg/l	22.9	-
	MN	mg/l	.007	-
	MO	mg/l	<.01	-
	NA	mg/l	2.5	-
	NI	mg/l	<.02	-
	P	mg/l	<.1	-
	PB	mg/l	<.06	-
	SB	mg/l	<.06	-
	SE	mg/l	<.06	-
	SI	mg/l	1.56	-
	SN	mg/l	<.06	-
	SR	mg/l	.968	-
	TI	mg/l	<.002	-
	V	mg/l	<.01	-
	ZN	mg/l	<.002	-
NITROGEN/AMMONIA		mg/l	.018	2.39
/NITRITE		mg/l	<.002	.027
/NITRITE+NITRATE		mg/l	<.002	.03
/TOTAL		mg/l	.21	3
PH		Rel.U.	8.23	7.82
PHOSPHORUS/O-PO4		mg/l	<.001	.25
/TOTAL		mg/l	<.002	.434
/TOTAL DISSOLVED		mg/l	.004	.401
RESIDUE/FILTERABLE		mg/l	350	490
/NON-FILTERABLE		mg/l	<5	6
BC CLIENT STUDY CODE			20	20
SAMPLING AGENCY		EMScode	91	91
SITE IDENTIFIER/NUMBER			E223151	E223151
COLLECTION START DATE		y/m/d	96/09/17	96/09/17
UPPER DEPTH		metres	0.5	19
TEMPERATURE ON ARRIVAL		deg.C	6	6

Appendix B

Tributary Stream Data

D.F.O. / M.O.E. Stream Survey Form

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz): Unnamed Ck local: Inlet #1 to Unnamed Lk Access: FT Method:
Watershed Code: 230-9358 Length (m):
Location: ~15 m U/S of Unnamed Lk (Creek Lk) 94 C/8 1 10 FT
UTM: 10.471852.6250ftd Y E
Date: Y M D: 96 09 16 Time: 11:10 Agency: Photos: RL # 11: 3-4 Air Photos: 30 BCB 93088 No. 206

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave. Channel Width (m)	2.7	ST	1.7 3.2 3.2 2.8
	Ave. Wet Width (m)	0.4	ST	0.2 0.4 0.5 0.3
	Ave Max Riffle Depth (cm)	/	CM	
	Ave Max Pool Depth (cm)	35	CM	
	Gradient %	2	SC	
1	Rock 5 Bdrock 0 Fines 95 Gravel		GE	
	Bed Channel		GE	
	Bank Veg		GE	
	Bank Stable %	65%	GE	
	COVER: Total %	15	GE	
	Comp sum 100%	Dp Pool 10	L.OG 5	Boulder 0	In veg 0	Over veg 25	Current 60
	Crown Closure %	0	E.	Aspect	SSG

C	MATERIAL	%
	clay silt sand (<2 mm)	55
	small (2-16 mm)	10
	large (16-64 mm)	5
	sm cobble (64-128 mm)	0
	lge cobble (128-256 mm)	0
	boulder (>256 mm)	0
	Bedrock	0
	D_{50} (cm) 1.5	E Correction L M H

C	BANKS	
2	Height (m) 0.1	% Unstable 50
	Texture F G L R	
	Confinement . EN CO FC OC UC N/A	
	Valley Channel Ratio 0-2 2-5 5-10 >10 N/A	
	Dry L M H Flood	
	Flood Signs Hi (m): O	Braided Y N
	Bars (%) O	pH	O_2 (ppm)
	Water Temp. °C: 6	Turb. (cm)	Cond. (25 °C)

DISCHARGE over 2.5 m

Parameter	Value	Method	Specific Data
Wetted Width (m)	0.3	ST	0.28 0.35 0.30
Mean Depth (m)	0.2	DM	0.20 0.17 0.12
Mean Velocity (m/s)	0.3	FOM	7.3 / 7.9 / 7.6 / 7.7 / 8.2 → average = 7.7 sec
Discharge (m^3/s)	0.013	FOM	

REACH SYMBOL (Fish)
Width Value Channel Stable Bed Material

AC	No.	Size Range (mm)	Use

STREAM/VALLEY CROSS-SECTION (Looking Downstream) ☐ L R
PLANIMETRIC VIEW ☐

COMMENTS
Channel Stability ☐ Debris ☐ Management Concerns ☐ Obstructions ☐ Riparian Zone ☐ Valley Wall Processes ☐ Etc.
~ 1 m wide x ~ 25 cm ; mvt. depth ~ 0.5 - 1.0 m
Lines covered by moss / ridge grates

Edited by
Date Y M D

DFO / MOE
STREAM SURVEY FORM

Stream Name (gaz.): Unnamed Cr. | Local: 0.4 km u/s of Unnamed Lk | Access: FT | Method:
Watershed Code: 230-93-58 | Length (m): | 20 FT
Location: ~180 m D/S of Unnamed Lk (Crash Lk) | Map: 94 C/8 | UTM: 10 [illegible] | Y (N) | E-W
Date: 96/09/16 | Time: 1537 | Agency: | Observers: mH, KmJ | Photos: 30:19-20 | Air Photos: 30BCB 93088 No. 206

C	PARAMETER	VALUE	METH	SPECIFIC DATA
	Ave Mac Riffle Width (m)	3.6	ST	3.9 3.7 3.2
	Ave Mac Riffle Depth (cm)	23	ST	22 22 24
	Ave Mac Pool Depth (cm)	23.2	CM	23 23 24 24
	Ave Mac Pool Depth (cm)	—	CM	
	[illegible]	3.5	SC	
	[illegible] 0 [illegible] 60 [illegible] 40 [illegible]		GE	
	[illegible]		GE	
	[illegible]		GE	
	Stable %	70	GE	
	COVER: Total %	60	GE	

Comp sum 100%	De Pass	L.O.D.	Boulder	Low veg	Over veg	Cutbank
	0	25	0	15	10	10

Crown Closure % 50 | E | Aspect: SE | D_{50}/cm: 3 | E | Correction: L (M) H

	%
clay, silt, sand (<2 mm)	30
small (2–16 mm)	50
large (16–64 mm)	15
sm cobble (64–128 mm)	5
lg cobble (128–256 mm)	0
boulder (>256 mm)	0
[illegible]	0

C	BANKS
1	Height (m): 0.1 Number: 30
	Texture: (F) G L R
	Confinement: EN CO (FC) OC UC N/A
	Valley Channel Ratio: 0-2 2-5 5-10 (10+) N/A
	[illegible] Dry L (M) H Flood
	Flood Signs: Height: 0 Braided: Y (N)
	Bars (%): 0 DH: Q 100m³/s:
	Water Temp °C: 12 Cond. (25°C):

Over 4.0m DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	2.1	ST	1.7 2.5
Mean Depth (m)	0.15	OM	0.12 0.14 0.17 0.16 0.15
Mean Velocity (m/s)	0.92	FOM	4.6 4.2 4.3 4.2 4.4 → average = 4.3 sec
Discharge (m³/s)	0.22	FOM	

REACH SYMBOL (Right)

Right Valley Channel Slope | Bed Material

AE: 1st Dec. 87 | 55187

No.	Size Range mm		Use

STREAM/VALLEY CROSS-SECTION (Looking Downstream) ☐
PLANIMETRIC VIEW ☐
L R

COMMENTS

Channel Stability ☐ Debris ☐ Management Concerns ☐ Obstructions ☐ Riparian Zone ☐ Valley Wall Processes ☐ Etc.

Banks covered in moss, willow, alder & devil's club [illegible]

Entered by:
Date Y M D:

Appendix C

FISH SCALE ANALYSIS

Age Determination Completed By:

A.M.C. Technical Services Ltd.
Melinda M. Hirst
6809 Phillip Road.
Lantzville, B.C.
VOR 2HO

SEE ORIGINAL COPY

FOR SCALE SAMPLE READINGS

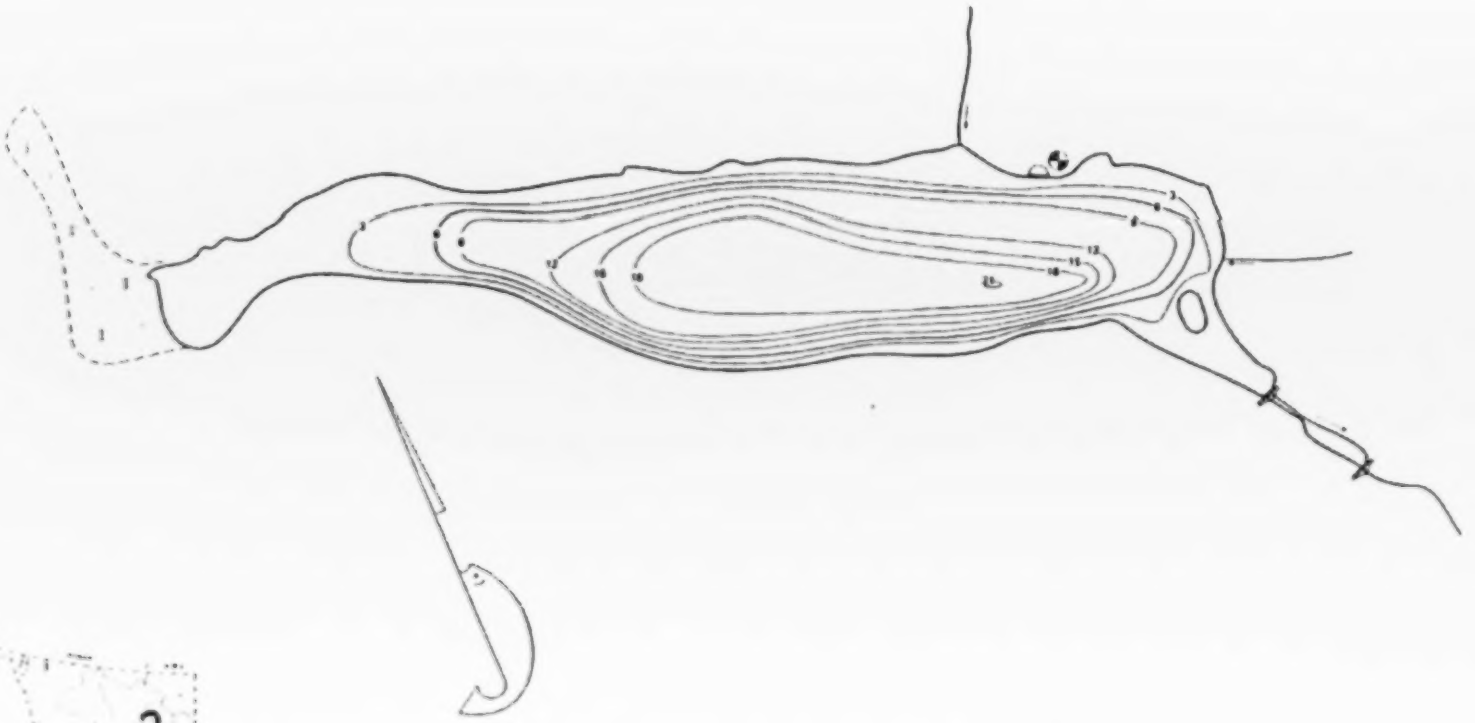
ORIGINAL COPY IS HELD BY

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

PRINCE GEORGE, B. C.

Appendix D

BATHYMETRIC MAP



Reduced to
34%
of Original Size

STATISTICS AT TIME OF SURVEY

Elevation	925	m. ?
Surface Area	175662	sq. m.
Area above Gen. Contour	92115	sq. m.
Volume	1404080	cu. m.
Mean Depth	7.6	m.
Maximum Depth	21.1	m.
Perimeter, Main Shore	2970	m.
Perimeter, Islands	130	m.
Beach Mark	2.0	m.

Unnamed Crash Lake

BY Jennifer Pybus
B.C. Conservation Foundation